CLAIMS

1. An unnecessary-film removal apparatus for supplying a chemical solution only to an unnecessary portion of a film formed on a surface of a substrate including a peripheral portion thereof to thereby remove the unnecessary-film portion formed on the substrate, characterized by comprising:

substrate holding means for holding said substrate so as to allow in-plane rotation thereof;

chemical solution supply means for supplying said chemical solution;

a shield member covering the main surface of said substrate so as to form a constant clearance with respect to the main surface of said substrate in a removal area of the main surface of said substrate and form a space larger than said clearance in a non-removal area of the main surface of said substrate, said clearance being set to a size that allows said chemical solution to enter said clearance and to spread only in said clearance; and

a chemical solution guide member located outside said shield member so as to form a flow path for said chemical solution cooperatively with said shield member;

wherein said shield member and said chemical solution guide member being disposed so as to be rotatable along with said substrate holding means.

2. An unnecessary-film removal apparatus for supplying a chemical solution only to an unnecessary portion of a film formed on a surface of a substrate including a peripheral portion thereof to thereby remove the unnecessary-film portion, characterized by comprising;

substrate holding means for holding said substrate so as to allow in-plane rotation thereof;

chemical solution supply means for supplying said chemical solution; and

a shield member covering the main surface of said substrate so as to form a constant clearance with respect to the main surface of said substrate in a removal area of the main surface of said substrate and form a space larger than said clearance in a non-removal area of the main surface of said substrate;

said shield member being provided with distance adjusting members that are three or more in number and that face the main surface of said substrate such that said clearance is set to a size that allows said chemical solution to enter said clearance and spread only in said clearance;

arrangement positions of said distance adjusting members being set such that, when said arrangement positions are connected to each other with a straight line, they are not located on the straight line and, when said shield member is rotated with respect to said substrate by a predetermined angle about the center of the surface of said substrate, they do not overlap the arrangement positions of said distance adjusting members positioned before rotation;

said shield member being disposed so as to be rotatable along with said substrate holding means.

3. An unnecessary-film removal apparatus for supplying a chemical solution only to an unnecessary portion of a film formed on a surface of a substrate including a peripheral portion thereof to thereby remove the unnecessary-film portion, characterized by comprising:

substrate holding means for holding said substrate so as to allow in-plane rotation thereof;

chemical solution supply means for supplying said chemical solution; and

a shield member covering the main surface of said substrate so as to form a constant clearance with respect to the main surface of said substrate in a removal area of the main surface of said substrate and form a space larger than

said clearance in a non-removal area of the main surface of said substrate;

said shield member being provided with distance adjusting members that are three or more in number and that face the main surface of said substrate such that said clearance is set to a size that allows said chemical solution to enter said clearance and spread only in said clearance;

arrangement positions of said distance adjusting members being set such that, when said arrangement positions are connected to each other with a straight line, they are not located on the straight line;

a moving mechanism being provided in which said distance adjusting members each move in parallel to a side direction of said substrate by a predetermined amount;

said shield member being disposed so as to be rotatable along with said substrate holding means.

4. An unnecessary-film removal apparatus for supplying a chemical solution only to an unnecessary portion of a film formed on a surface of a substrate including a peripheral portion thereof to thereby remove the unnecessary-film portion, characterized by comprising;

substrate holding means for holding said substrate so as to allow in-plane rotation thereof;

chemical solution supply means for supplying said chemical solution; and

a shield member covering the main surface of said substrate so as to form a constant clearance with respect to the main surface of said substrate in a removal area of the main surface of said substrate and to form a space larger than said clearance in a non-removal area of the main surface of said substrate, said clearance being set to a size that allows said chemical solution to enter said clearance and to spread only in said clearance;

said substrate holding means having a plurality of substrate holding members so as to hold said substrate at a plurality of positions on a bottom surface and side surfaces of said substrate;

arrangement positions of said substrate holding members being set such that, when said substrate is rotated with respect to said substrate holding members by a predetermined angle, the arrangement positions of said substrate holding members do not overlap previous ones positioned before rotation;

said shield member being disposed so as to be rotatable along with said substrate holding means.

5. An unnecessary-film removal method using the unnecessary-film removal apparatus according to claim 1, characterized by placing said substrate on said substrate holding means and supplying the chemical solution from said chemical solution supply means while integrally rotating said substrate, said shield member, and said chemical solution guide member so that the chemical solution is supplied only to the unnecessary portion of the film formed on the surface of said substrate including its peripheral portion through the flow path formed by said shield member and said chemical solution guide member, thereby removing the unnecessary film portion.

6. An unnecessary-film removal method using the unnecessary-film removal apparatus according to claim 2, characterized by placing said substrate on said substrate holding means and supplying the chemical solution from said chemical solution supply means while integrally rotating said substrate and said shield member so that the chemical solution is supplied only to the unnecessary portion of the film formed on the surface of said substrate including its peripheral portion along an outer wall of said shield member, thereby removing the unnecessary film portion, and thereafter, rotating said shield member with respect to said substrate by the predetermined angle about the center of the

main surface of said substrate and removing the unnecessary film portion formed at positions where said distance adjusting members before rotation and said substrate were in contact with each other.

7. An unnecessary-film removal method using the unnecessary-film removal apparatus according to claim 3, characterized by placing said substrate on said substrate holding members of said substrate holding means and supplying the chemical solution from said chemical solution supply means while integrally rotating said substrate and said shield member so that the chemical solution is supplied only to the unnecessary portion of the film formed on the surface of said substrate including its peripheral portion along an outer wall of said shield member, thereby removing the unnecessary film portion, and thereafter, rotating said substrate holding means with respect to said substrate by the predetermined angle about the center of the main surface of said substrate and removing the unnecessary film portion formed at positions where said substrate holding members before rotation and said substrate were in contact with each other.

8. A photomask blank manufacturing method having a film forming process for forming a film such as an opaque film on an optically transparent substrate, said photomask blank manufacturing method characterized by comprising an unnecessary-film removal process for removing an unnecessary film formed at an unnecessary portion in said film forming process, by the use of the unnecessary-film removal method according to any one of claims 5 to 7.